

SECTION 011900
SITE DESIGN DATA

101. **GENERAL**

101.1 This section provides site design data and includes the following:

- a. ASHRAE data.
- b. Plant coordinate system.
- c. Structural Design Requirements

102. **ASHRAE DATA**

102.1 Table 1-1 below lists the major site conditions, which are based on American Society of Heating, Refrigeration and Air Conditioning (ASHRAE) data.

TABLE 1-1
MAJOR SITE CONDITIONS

Parameter	Data
Nearest ASHRAE (2005 Fundamentals) weather data location	North Platte, Nebraska
World Meteorological Organization Number	725620
Latitude / Longitude	41.08°N / 101.14°W
Elevation	3,118 feet
Standard pressure	13.2 psia (26.8 in. Hg)
Heating dry bulb temperature, 99.6% occurrence	-17.9°F
Extreme wind speed, 1% occurrence	27.6 mph
50-year occurrence temperatures:	
High (Dry Bulb)	109.1°F / 42.8°C
Low (Dry Bulb)	-34.3°F / -36.8°C
High (Wet Bulb)	79.9°F / 26.6°C
Cooling dry bulb temperature, 0.4% occurrence	95.6°F / 35.3°C
Cooling wet bulb temperature, 0.4% occurrence	74.0°F / 23.3°C

103. **PLANT COORDINATE SYSTEM**

103.1 GGS Plant Site Coordinates and Elevations Datum System shall be used for all work performed under this contract. CONTRACTOR shall incorporate the GGS Plant Site Coordinates and Elevations Datum System in all vendor design drawings, models, and construction documents. GGS Plant Site Coordinates and Elevations Datum System shall be used for all work performed under this contract. CONTRACTOR shall incorporate the GGS Plant Site Coordinates and Elevations Datum System in all vendor design drawings, models, and construction documents.

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103.2 Baseline monuments indicating GGS Plant Coordinates and Elevations and their corresponding Nebraska State Plane Coordinates (NAD83) and NAVD88 Datum will be established by the DISTRICT and provided to the CONTRACTOR after the award as the basis of contraction. The CONTRACTOR shall verify the accuracy of the monuments, notify the DISTRICT of any deviation or discrepancy, and take full responsibility, hereafter, for the execution of contract.

103.3 CONTRACTOR shall install additional bench marks as necessary to facilitate construction. The additional construction bench marks shall be verified by an independent third party surveyor and reported to the DISTRICT for record prior to the commencement of construction.

104. STRUCTURAL DESIGN REQUIREMENTS

104.1 General

- a. All structural design for buildings, vessels, tanks and ductwork including connections and foundation anchorage shall be prepared by or under the supervision of a registered design professional who is licensed to practice structural engineering in the state of Nebraska. All design calculations and design drawings shall be signed, sealed and dated by that registered design professional.
- b. Codes, specifications, standards, loads and materials to be used for structural design are specified in applicable sections of this specification.
- c. Buildings, vessels, tanks and ductwork including connections and foundation anchorage shall be designed for the general and environmental loads indicated in Table 1 and Table 2 respectively.
- d. Structures shall have adequate strength, stiffness and rigidity for the specified and required loads to which the structure will be subjected. All structures and support elements shall be without excessive vibration or deflection for the imposed loads and intended service. Structures shall be braced steel structures designed to resist all vertical and horizontal loads to which they may reasonably be expected to be subjected to, including, as a minimum, dead load, live load, snow load, equipment operation, wind load, seismic load, internal pressures, dynamic pressures, and thermal and friction loads.
- e. The code of record for the project is the International Building Code (IBC) 2006.
- f. Roof drainage shall be designed in accordance with IBC 2006 and the International Plumbing Code (IPC) 2006.
- g. Grout thickness for building column base plates, equipment, pipe supports and other facilities shall be determined by CONTRACTOR.
- h. Reagent Preparation Building shall be configured and designed to support and access the limestone conveyors supplied by Others.
- i. Waste Dewatering Building shall be configured to access the waste disposal conveyors supplied by Others consisting of: a diverter gate at the discharge end of each belt filter, 2 (two) collecting conveyors, an emergency stack out conveyor and a transfer conveyor to the radial stacker transfer house. CONTRACTOR's belt filter concrete floor shall be designed to support a diverter gate load for each belt filter of approximately 20 kips.

104.2 Absorber, Ductwork, Vessels and Tanks

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- a. Absorber inlet duct, absorber, absorber outlet duct and absorber outlet transition duct shall be designed for the pressure and temperature design parameters indicated in Section 441130, Wet Flue Gas Desulfurization System.
- b. Steel tanks and vessels (such as slurry tanks, absorber vessel etc) shall be designed, fabricated and installed in accordance with API 650 or AWWA D100 and AISC Steel Construction Manual. Dimensional tolerances, inspection and testing requirements shall be based on these and other applicable USA industry standards.
- c. Concrete tanks and vessels (such as tile lined concrete absorber vessel) shall be designed, fabricated and installed in accordance with ACI 350.3, ACI 318 and AWWA D110. Dimensional tolerances, inspection and testing requirements shall be based on these and other applicable USA industry standards.
- d. FRP vessels and ductwork shall be designed, fabricated and installed in accordance with ASME RTP-1, Reinforced Thermoset Plastic Corrosion Resistant Equipment, or ASME B&PV Section X, Fiber-Reinforced Plastic Pressure Vessels. Dimensional tolerances, inspection and testing requirements shall be based on these and other applicable USA industry standards.
- e. Concrete bins and silos shall be designed in accordance with ACI 313. Dimensional tolerances, inspection and testing requirements shall be based on these and other applicable USA industry standards.
- f. CONTRACTOR may elect to specify more restrictive requirements. If dimensional tolerances, inspection and testing requirements are not specified in the above standards, CONTRACTOR shall determine same. Dimensional tolerances, inspection and testing requirements shall be specified in CONTRACTOR's shop and field QA/QC procedures and submitted to DISTRICT and DISTRICT's engineer for review prior to the start of fabrication.
- g. Determination of seismic loads and seismic design of vessels and tanks and their anchorage shall comply with Chapter 15 of ASCE 7-05 and IBC 2006.
- h. Absorber, absorber outlet duct and absorber outlet transition duct shall be designed for the minimum sludge/ash loads indicated in Figure 1.
- i. The roof of vessels and tanks shall be designed for a minimum live load of 75 lbs/sq ft. Access platforms supported by vessels and tanks shall be designed for minimum live load of 100 lbs/sq ft.
- j. Yield strength, modulus of elasticity and coefficient of expansion shall be modified to account for elevated temperatures.
- k. Design of steel ductwork shall be consistent with ASCE publication, The Structural Design of Air and Gas Ducts for Power Stations and Industrial Boiler Applications, 1995 and in accordance with AISC 360, Specification for Structural Steel Buildings.
- l. All ductwork sliding supports shall include a slide bearing assembly at the interface between the ductwork and its support steel. The design coefficient of friction shall be based on a value provided by the manufacturer.
- m. The location and configuration of the condensate collection devices in the absorber outlet and absorber outlet transition ductwork shall be determined by the CONTRACTOR's flow model. The absorber

outlet and absorber outlet transition ductwork shall have provisions to drain the condensate from the ductwork and its expansion joints.

TABLE 1-2

1.	Dead load	Structural self-weight
2.	Equipment dead load	Equipment self-weight
3.	Equipment live load	Equipment, friction due to bulk material flow and/or dynamic load effects
4.	Live load	<ul style="list-style-type: none"> • In accordance with IBC 2006 and ASCE 7-05 • Galleries-100 psf (minimum) • Stairs-100 psf on horizontal projected area • Elevated concrete floors 200-psf minimum
5.	Bulk material load	Minimum 120 pcf for limestone storage
6.	Pipe load	Determined by CONTRACTOR
7.	Cable tray/conduit load	Determined by CONTRACTOR. Cable tray and conduit loads to assume tray/conduit is completely full with cables.
8.	Friction load	Load due to thermal expansion and contraction based on coefficient of friction
9.	Thermal load	Load due to differential temperatures
10.	Pressure load	Operating, accident and transient pressure including unbalanced and dynamic effects
11.	Construction load	Temporary loads due to formwork, false Work, construction equipment etc including any unbalanced load effects
12.	Contingency column load	A contingency load of 25 kips applied at the top of each structural support column shall be considered. This load is in addition to all other loads and shall be considered in all load combinations except uplift. Contingency loading does not apply to intermediate posts and "Zipper Columns." Zipper columns are installed at the apex of a chevron-braced bay.
13.	Rain-on-snow surcharge load	Buildings, tanks, ducts shall have roof slopes to preclude rain-on-snow surcharge loads.
14.	Rain / Ponding load	Buildings, tanks and ducts shall have roof slopes to preclude ponding.

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Specification G-5301
Issue: Client Comments, Rev. 3
September 8, 2011
Project No. 12681-006

15.	Impact load (except crane load) impact	The increase in live load due to impact shall be as specified in IBC 2006, unless otherwise specified.
16.	Crane loads	The crane loads shall be obtained from the crane vendor (maximum wheel load and bumper stop load) and the impact effects shall be in accordance with the requirements of AISC and ASCE Standard 7.
17.	Hoist loads	Hoist loads shall consist of lifted load plus weight of hoist and trolley plus an impact allowance in accordance with the Monorail Manufacturers' Association Specifications for Underhung Cranes and Monorail Systems.
18.	Elevator Loads	The elevator loads shall be obtained from the elevator vendor and the impact effects shall be in accordance with the requirements of Section ASCE Standard 7.
19.	Vibration loads	All supports and foundations for vibrating equipment shall be designed to limit vibrations based on equipment manufacturer's recommendations.

Note 1. All loads shall be combined in accordance with IBC 2006, ASCE 7-05, and ACI 318-05 as applicable. CONTRACTOR's Registered design professional shall include in the design criteria the basic load combinations used for each of the primary structures.

TABLE 1-3

	Design Parameter (IBC 2006-ASCE-7-05)
Wind	Basic Wind Speed (3 second gust) $v = 90$ mph Exposure Category C Occupancy Category III Wind Importance Factor 1.15
Snow	Ground Snow Load 25 psf Snow Importance Factor 1.1

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Seismic	Site Class D Occupancy Category III Mapped Spectral Acceleration for short period $S_s = 0.094g$ Mapped Spectral Acceleration for one second period $S_1 = 0.035g$ Seismic Design Category A
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104.3 Steel and Gallery Design Requirements

- a. CONTRACTOR shall detail and furnish all connections including gallery work based on connections designed by the CONTRACTOR's Registered design professional in the State of Nebraska.
- b. The shop detail and erection drawings shall be submitted to the CONTRACTOR's Registered Professional Engineer for review and acceptance prior to fabrication.
- c. The correction of field fit-up problems that are caused by misfabrication or by errors on the CONTRACTOR's shop detail drawings are the responsibility of the CONTRACTOR.
- d. CONTRACTOR's shop detail drawings shall account for a 3' high curb around the perimeter of the following building; Absorber Building Reagent Prep Building and Gypsum Dewatering Building.
- e. CONTRACTOR shall be responsible for the design of all additional or miscellaneous steel required to support grating panels at openings and cutouts through grating panels.
- f. Walkways including stair and stair landings shall be 3'-6" minimum in width. Access platforms and stairs provided for incidental equipment access may be minimum 2'-6" wide.
- g. The minimum clear distance between facing sides of rails for fixed ladders shall be 16 inches. The use of step ladders is not permitted.
- h. The minimum headroom clearance above platforms, walkways, and stairs shall be 7'-0" to the lowest point of any overhead obstruction.
- i. Ladders are only acceptable as a second means of egress only when stairs will not fit and are never acceptable as a sole means of access for any area that require operations maintenance.
- j. Anchor rods for all buildings shall be of ASTM A193 Grade B7 material for corrosion resistance.

104.4 CONTRACTOR'S Loading and embedment data

- a. CONTRACTOR's loading drawings shall include, but are not limited to, the following information required for foundation design by Others:
 - a1. Loading drawings shall include a table of all loads to be supported by the DISTRICT's foundations at all interface points. The drawings and tables shall indicate dimensioned location, magnitude, and direction (horizontal, downward, vertical uplift) of the applied load. The load tables shall list the load component and direction for each basic load case at all interface points. Horizontal loads shall indicate direction of the applied load (North/South, East/West).

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- a2. Loading drawings shall include vibratory equipment requirements for all equipment with mass greater than 5 kips with operating speed greater than 1 cycle per second. Drawings shall specify dynamic foundation response acceptance criteria, total mass of moving parts, operating speed (constant, variable, range), permissible peak to peak amplitude (mils) and eccentricity of rotating mass to bearing supports.
- a3. Loading drawings shall include equipment self weight, operating, accident, and environmental loads.
- a4. Loading drawings shall include vertical and lateral differential or absolute settlement criteria for foundations supplied by Others.
- b. CONTRACTOR's embedment drawings shall include, but are not limited to, the following information required for foundation design by Others:
 - b1. Anchor bolt setting drawings that indicate dimensioned location of anchor bolt, bolt projection above top of concrete, thread length, bolt diameter, bolt material, bolt installation torque and special details such as anchor bolt sleeves if required for adjustment).
 - b2. Embedment plate/angle setting drawings that indicate plan and elevation location of plate/angle, minimum size of embedment plate, location/detail of attachment to embedded plate, and extent of embedded angle.
 - b3. Piping embedments in concrete that indicate location, elevation, size (diameter, weight), material, interface/flange location detail, and pipe slope.
 - b4. Drawings shall indicate all pockets required in the concrete foundations for beam support, grating support, column base plate shear bars, etc.

END OF SECTION 011900

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